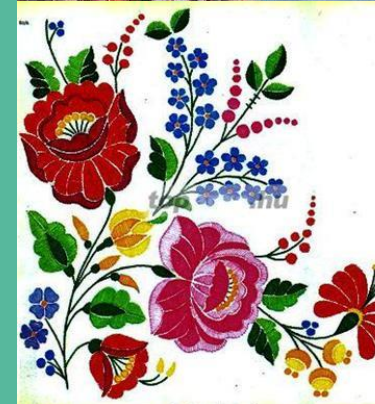


Human Centered  
AI Masters  
Our AIM  
Human at the Center!

Barry Feeney, TU Dublin

hcaim



# Make IT Better You Can Help Make Trustworthy AI



*A collaboration between industry, academia and research centers to define the BoK for AI developers in a European context*

- *4 Masters Programmes*
- *Online courseware in EU Languages*



Co-financed by the Connecting Europe  
Facility of the European Union

**hcaim** human centred  
artificial intelligence  
masters

# Who ?

## Consortium of Excellence Centres, Universities and SMEs.

The image displays a grid of logos for various organizations, categorized into three groups:

- Universities:**
  - TU DUBLIN (Technological University Dublin)
  - Műegyetem 1782 (University of Debrecen)
  - University of Applied Sciences Utrecht
  - Università degli Studi di Napoli Federico II
- Research Centers:**
  - Consiglio Nazionale delle Ricerche
  - CeADAR (Ireland's Centre for Applied AI)
  - ESI (European Software Institute Center Eastern Europe)
- SMEs:**
  - Real Ai
  - nathean
  - FIVEN (Future Driven)



# Motivating factors

## Technology not only factor in success of AI

- Technology has advanced rapidly last few years
- AI starting to move from Labs to Society
- The 'big questions' no longer (only) about technology...

## Social and legal more and more important

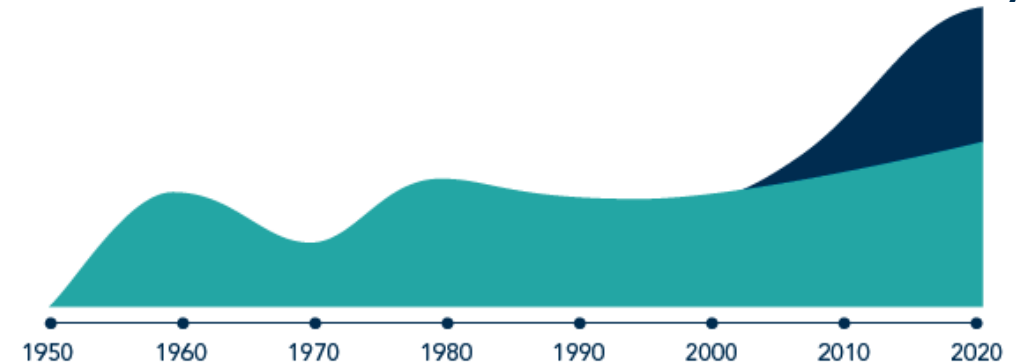
- EU (and others) are recognizing AI as 'transformational technology'
- Comparable to the invention of steam power, electricity, and the digital computer
- Lasting impact on society
- Regulation required to get it right

## Design factors

- Plenty of ethics (> 15 ECTS)
- Attention on application & deployment of AI
- Integration of ethics with technology
- Research-driven

### AI in Labs

### AI in Society

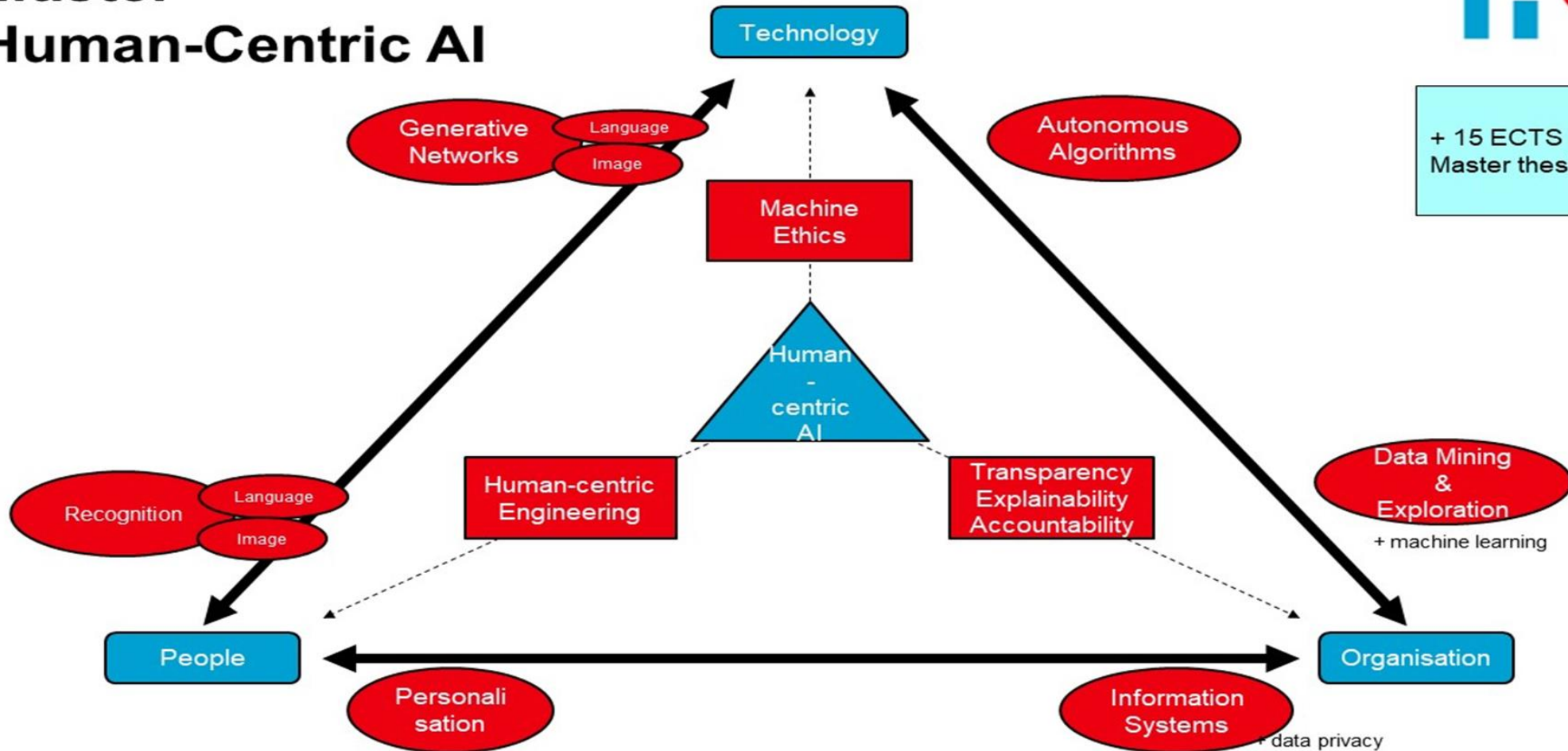


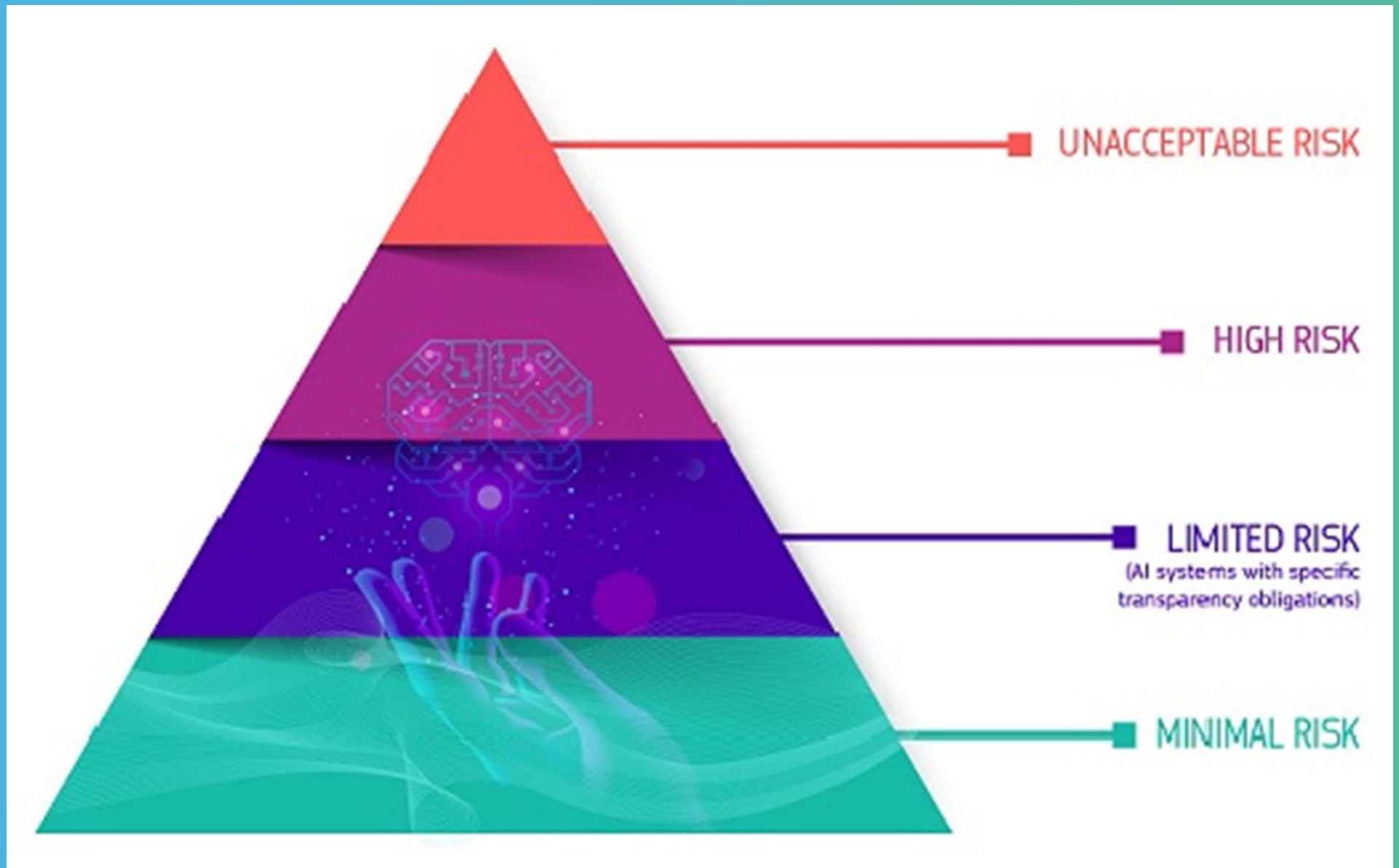
Source: NL Scientific Council for Government Policy, "Opgave AI", 11-11-2021

The screenshot shows the official European Commission website. At the top, there is the European Commission logo and a search bar. Below the header, the main navigation menu includes 'Home', 'Policies', 'News', 'Library', 'Funding', 'Calendar', and 'Consultations'. The current page is titled 'Regulatory framework proposal on Artificial Intelligence'. The main content area features the heading 'Regulatory framework proposal on Artificial Intelligence' and a sub-heading 'The Commission is proposing the first ever legal framework on AI, which addresses the risks of AI and positions Europe to play a leading role globally.' A small image credit for '© gorodenkoff - iStock Getty Images Plus' is visible in the bottom right corner of the content area.

# Master Human-Centric AI

+ 15 ECTS  
Master thesis project





**Critical infrastructures** (e.g. transport), that could put the life and health of citizens at risk

**Educational or vocational training**, that may determine the access to education and professional course of someone's life (e.g. scoring of exams)

**Safety components of products** (e.g. AI application in robot-assisted surgery)

**Employment, workers management and access to self-employment** (e.g. CV-sorting software for recruitment procedures)

**Essential private and public services** (e.g. credit scoring denying citizens opportunity to obtain a loan)

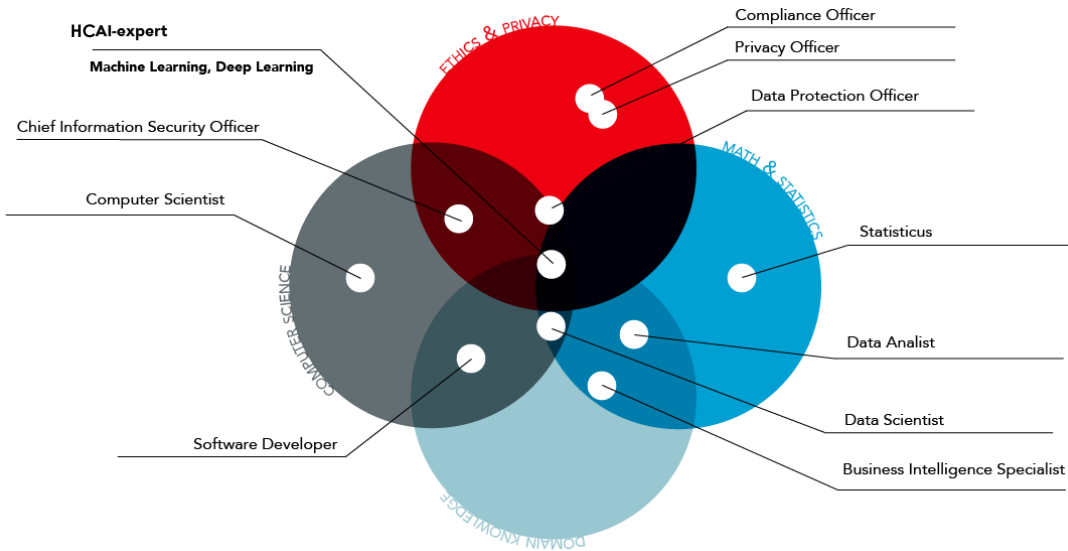
**Law enforcement that may interfere with people's fundamental rights** (e.g. evaluation of the reliability of evidence)

**Migration, asylum and border control management** (e.g. verification of authenticity of travel documents)

**Administration of justice and democratic processes** (e.g. applying the law to a concrete set of facts)



# HCAIM Profile

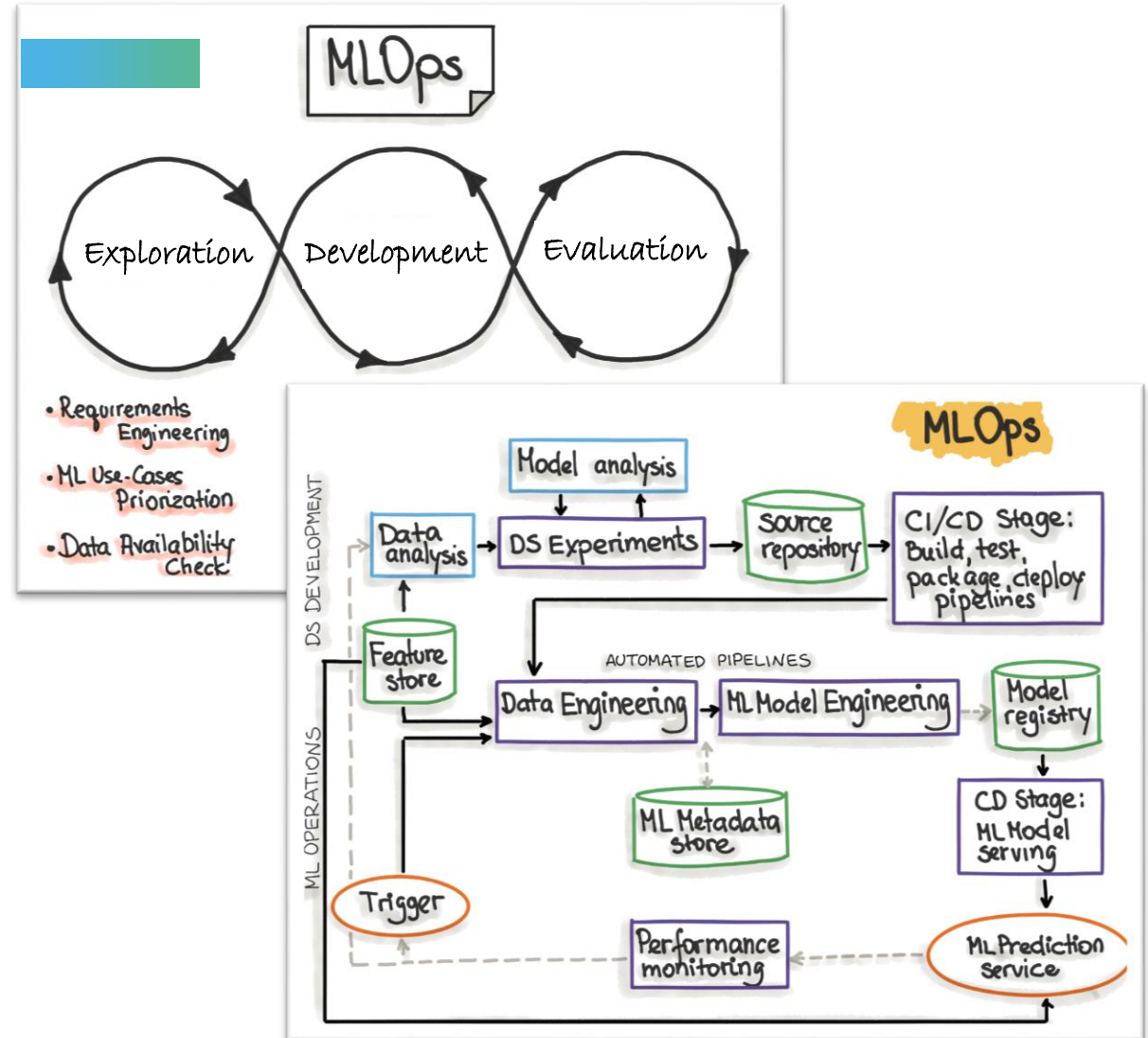


## Based on MLOps, but with Ethics

Ethical AI-Architect as a combination of:

- Data Scientist
- Data Specialist
- Systems Architect / Data Science Architect

Based on e-CF, EDISON and ICT Ethics.



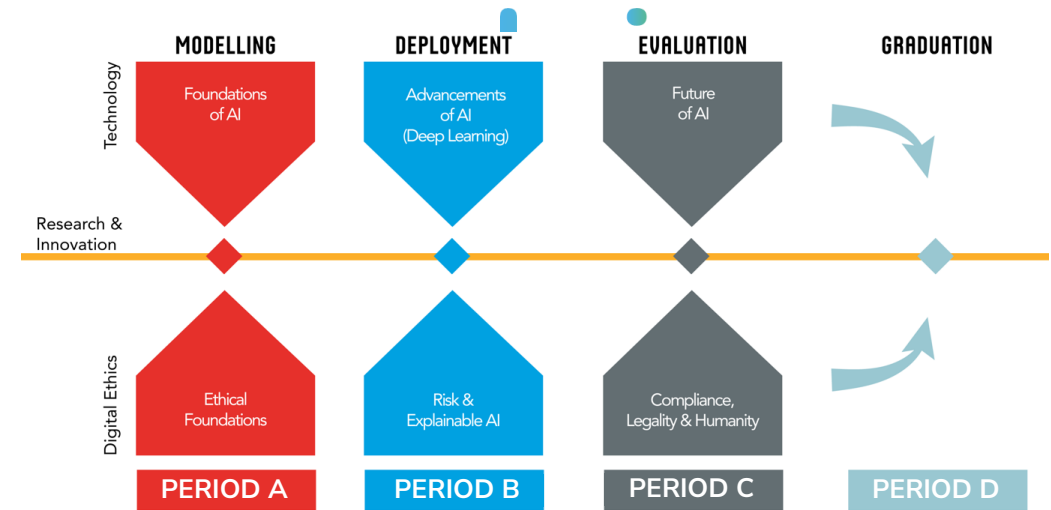
# HCAIM Curriculum

## Follows MLOps lifecycle

Modelling – data exploration, model building, ...

Deployment – integration with legacy, streams, ...

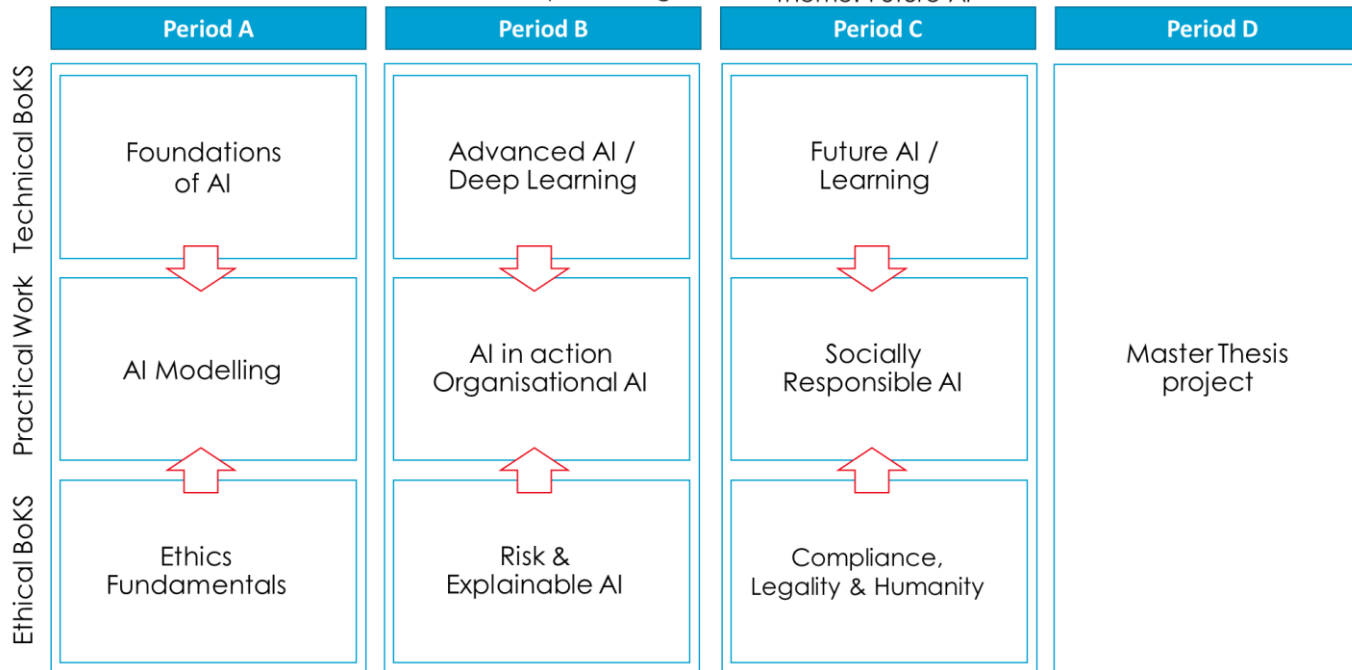
Evaluation – model drift, improvements, ...



Focus 1: Modelling  
Theme: Classic ML

Focus 2: Deployment  
Theme: Deep Learning

Focus 3: Evaluation  
Theme: Future AI



## but with ethics included:

Modelling – needs analysis, bias detection and mitigation, ...

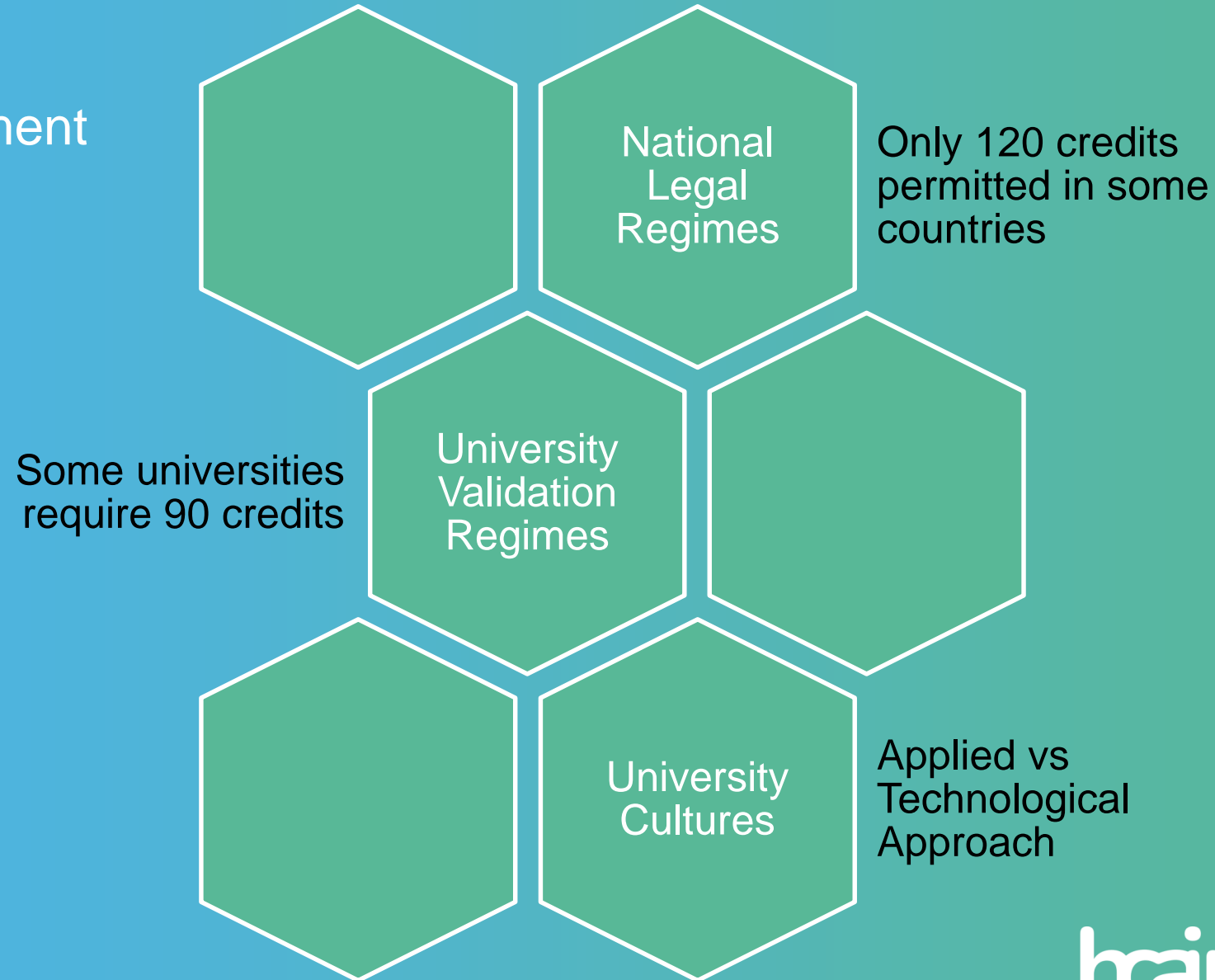
Deployment – explainability, transparency, risk detection & mitigation, ...

Evaluation – compliance, legal aspects, ethical auditing, ...

## Master level skills as thread (research)

# CHALLENGES

## For Rapid Development



# Solutions to challenges



## Agreed Body of Knowledge Delivered by ALL

- Arranged in 4 periods
- Transposed to National Format for Validation



## Validated Programmes

- Common Learning Events Identified & Allocated
- Challenges, Panels, Expert Workshops, Speakers



## Learning Event Schedule

- Members develop Learning Events
- Learning events available online

# An example of the materials which will be available shortly



human centred  
artificial intelligence  
masters

Practical Focus. Socially Responsible AI

About ▾ The Master's Programme ▾  
Ethical Focus. Compliance, Legality and Humanity

News & Events ▾

## EU And International Legislation/Frameworks On Data, AI, Human Rights And Equality

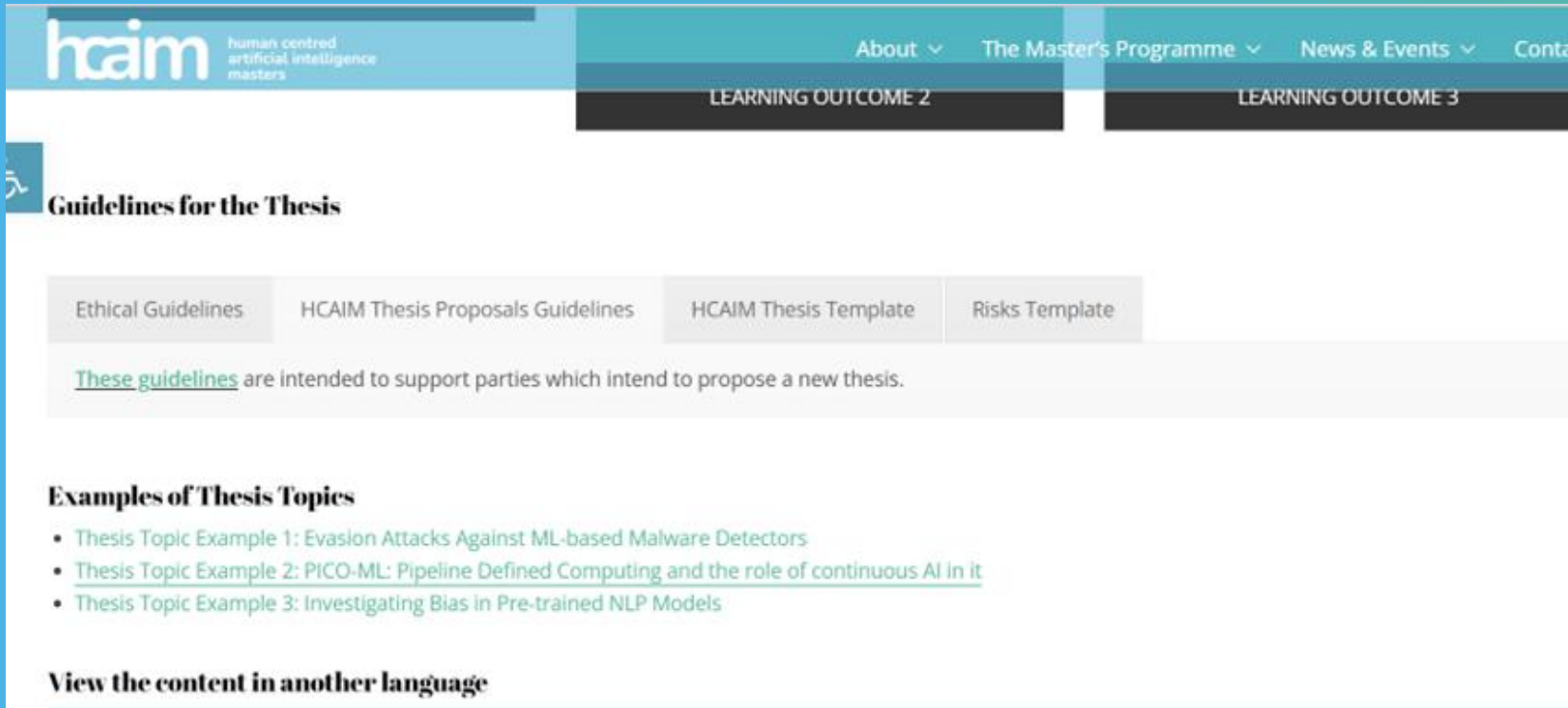
- Lecture: Overview Of Ethical, Professional And Legal Aspects Of HCAI Applications
- Interactive Session: Ethical, Professional And Legal Aspects Of HCAI Applications
- Lecture: Data And Its Challenges – EU GDPR, US COPPA, HIPPA
- Lecture: Data And Its Challenges – Data Regulations, Data Sourcing And HCAI Perspective
- Interactive Session: Data And Its Challenges. How GDPR Impacts AI Solutions
- Practical: Data And Its Challenges. An AI Regulation Exercise
- Lecture: EU Human Rights Legislation
- Interactive Session: EU Human Right Legislation – A Case Study
- Lecture: EU Proposal Of Regulation On HCAI Applications
- Interactive Session: EU Proposal Of Regulation On AI – A Case Study
- Practical: Effective Of EU Proposal Of Regulation On AI
- Lecture: Strengths And Limitations Of Existing Laws A Deeper Dive

## Data Management, Audit And Assessment

- Lecture: Data Security And Compliance, Data Lineage And Management
- Lecture: Governance And Stewardship, Key Stakeholders And Personal Data Management
- Practical: Common Roles And Cross Overs Between Data Management And AI Teams
- Practical: Investigate Data Lineage, Challenges And Potential Impact Of The AI Teams

We want to develop students with **real world challenges**.

- Process for accepting proposals and ensuring these match Human Centered characteristics
- International collaboration – Projects can be completed across 4 countries
- Blended IP week January



The screenshot shows the HCAIM website interface. At the top left is the HCAIM logo with the text 'human centred artificial intelligence masters'. To the right is a navigation menu with 'About', 'The Master's Programme', 'News & Events', and 'Contact'. Below the navigation are two dark blue boxes labeled 'LEARNING OUTCOME 2' and 'LEARNING OUTCOME 3'. The main content area is titled 'Guidelines for the Thesis' and features four tabs: 'Ethical Guidelines', 'HCAIM Thesis Proposals Guidelines', 'HCAIM Thesis Template', and 'Risks Template'. The 'Ethical Guidelines' tab is active, showing the text: '[These guidelines](#) are intended to support parties which intend to propose a new thesis.' Below this is a section titled 'Examples of Thesis Topics' with three bullet points: 'Thesis Topic Example 1: Evasion Attacks Against ML-based Malware Detectors', 'Thesis Topic Example 2: PICO-ML: Pipeline Defined Computing and the role of continuous AI in it', and 'Thesis Topic Example 3: Investigating Bias in Pre-trained NLP Models'. At the bottom left of the content area is a link: 'View the content in another language'.

For Educators – a rich source of lessons

Join the HCAI Consortium to have access to shared expertise as well as ‘flat’ learning objects.

The screenshot shows a web page with a blue header. The header contains the HCAI logo (human centred artificial intelligence masters) on the left and navigation links (About, The Master's Programme, News & Events, Contact) on the right. Below the header, the main heading is 'Instructions for Teachers'. The content area is titled 'Production Models using TFX Serving' and contains a list of bullet points. At the bottom of the content area, there is a horizontal flow diagram with seven steps: DATA INGESTION, TENSORFLOW DATA VALIDATION, TENSORFLOW TRANSFORM, ESTIMATOR OR KERAS MODEL, TENSORFLOW MODEL ANALYSIS, VALIDATION OUTCOMES, and TENSORFLOW SERVING. The first and fifth steps are enclosed in dashed boxes.

Background for students  
Background for teachers

human centred artificial intelligence masters

About ▾ The Master's Programme ▾ News & Events ▾ Contact

## Instructions for Teachers

### Production Models using TFX Serving

- This tutorial will introduce students to taking a trained model that was developed in a Jupyter Notebook (using TensorFlow 2.x and Keras) and saving the model in TensorFlow format. The tutorial will start by developing a basic CNN to identify the breed of a dog. We then save the model as a Tensorflow model. The tutorial uses the TFX (TensorFlow Extended) approach for MLOps where we focus this tutorial on the TRX serving component, which is building RESTful APIs to use/query in production environments. To do this we build a Docker TFX serving image, and deploy this image:
  - Locally (localhost)
  - Via Azure Container Instances (ACI), where a public IP address can be queried
- There are prior installs needed, please see "Preparation for Tutorial (obligatory)" above.
- The dataset is the Stanford dogs dataset, in which we use two classes of dogs, Jack Russells and Rhodesian Ridgebacks, the complete dataset can be found [here](#), We have also provided the subset used in this tutorial in the dataset section below.
- We have also provided all of the Docker CLI commands at the bottom of this tutorial page.

DATA INGESTION TENSORFLOW DATA VALIDATION TENSORFLOW TRANSFORM ESTIMATOR OR KERAS MODEL TENSORFLOW MODEL ANALYSIS VALIDATION OUTCOMES TENSORFLOW SERVING

# Make IT Better

## Make Trustworthy AI

- AI can contribute to solving significant challenges for society.
- The use of AI needs to be legal and ethical.
- Graduates making AI systems need the correct blend of technological skills and ethical knowledge.
- They also need to be relevant to industry needs.
- *Help future Graduates – Attract Great Talent – Give back!*

Join HC AIM

Participate in the Human Centered Consortium

Offer a placement/ Project idea

[humancentered-ai.eu](http://humancentered-ai.eu)

**hcaim** human centred  
artificial intelligence  
masters



# Human Centered AI Masters Programme

*The EU's approach to artificial intelligence centres on excellence and trust, aiming to boost research and industrial capacity and ensure fundamental rights.*

*To View Programme Preview*

*Scan this QR Code:*

*Follow this link:*

*<https://humancentered-ai.eu/programme-preview/>*

